

**UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS**

SINGULAR COMPUTING LLC,

Plaintiff,

v.

GOOGLE LLC,

Defendant.

Civil Action No. 1:19-cv-12551-FDS

Hon. F. Dennis Saylor IV

**PLAINTIFF SINGULAR COMPUTING LLC'S OPPOSITION TO DEFENDANT
GOOGLE LLC'S MOTION TO COMPEL**

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ATTORNEYS FOR THE PLAINTIFF

Plaintiff, Singular Computing LLC (“Singular”), respectfully submits this brief in opposition to the Renewed Motion of defendant, Google, Inc. (“Google”), to Compel (“Motion” or “Mot.”). For the reasons set forth below, the Motion should be denied.

I. INTRODUCTION

Google argues that Singular should be ordered to produce the “test code outputs” for the test results set forth in the First Amended Complaint (“FAC”). *See* Mot. at 5 (“Singular has not produced the output of the FAC Testing Source Code”; *id.* at 9 (“Singular must produce the output of the FAC Testing Source Code”).¹ As set forth below, notwithstanding Singular’s repeated explanations during the lengthy meet-and-confer process, Google continues to misstate the FAC testing process. The FAC test code outputs are those set forth in the FAC. Moreover, as Singular produced the FAC Testing Code that generated those results to Google months ago, Google itself has been able to confirm that the FAC test code outputs are accurate.

For example, although (inexplicably) not mentioned in its Motion, Google’s own computer expert states that the numbers in the picture cited in [paragraph 94 of] the FAC match numbers that can be produced by the FAC Testing Program. *See* Sealed Walker Decl., ¶ 36. Thus, there is no dispute that the results set forth in the FAC, as generated by both Singular and Google’s expert using Singular’s FAC testing code, are correct.

Google’s apparent complaint then is the way in which these results are presented in the FAC, namely as follows:

¹ There is no dispute that Singular has produced the test code for the results set forth in the FAC. *See* Mot. at 3 (“Singular produced the test code referenced in its FAC on February 18, 2021”).

		bf16
% of valid > 1.00%		4.65%
% of valid > 0.50%		55.39%
% of valid > 0.20%		92.69%
% of valid > 0.10%		98.15%
% of valid > 0.05%		99.52%

See, e.g., FAC (Dkt. No. 37), ¶ 94. As shown above, the FAC presents the test results in a table with descriptive labels (“% of valid ...”) that explain their significance. Google argues that these results cannot have been generated by the FAC Testing Source Code because the text “% of valid” does not appear in the Test Result Files.” Mot. at 8. The text “% of valid” however is not a test code output; it is simply an annotation that describes the significance of the numerical results shown (above in blue) in the right-hand column above. As set forth below, these numerical results are identical to the test results generated by the FAC Testing Code that Google admits Singular provided to Google on 18, 2021, *See* Motion at 3, 7; *see also* Walker Decl. ¶33.

II. ARGUMENT

As counsel for Singular has explained to counsel for Google on numerous occasions, the test program that generated the numbers set forth in Singular’s FAC does not produce permanent “output files”. *See, e.g.*, Ex. A (“The testing code used to generate the data relied upon in the First Amended Complaint does not produce “output files”).² Instead, the FAC Testing Code displays a typical transient output on an interactive computer terminal screen. Moreover, the FAC Testing Code that Singular produced to Google, including instructions for compiling the

² Exhibit A is attached to the accompanying Declaration of Brian Seeve.

code and executing the compiled test program, admittedly contains all of the information needed to reproduce the *numbers* (i.e. test code outputs) set forth in the FAC,. The numbers in paragraph 94 of the FAC are the results. Furthermore, Google’s own expert, Dr. Martin Walker, admits that he compiled the FAC Testing Code, executed the test, and obtained outputs that should match the test code outputs cited in Singular’s FAC. *See* Walker Dec. ¶ 36. Thus, Google already has the test results, and the code that produced the test results, in Singular’s FAC.

As Singular previously explained to Google, *see supra*, the FAC Testing Code does not generate “output files.” Instead, it displays a transient output in an interactive computer terminal, as shown below. The FAC Testing Code produced to Google admittedly generates the exact same numbers (in blue) as Singular included in the FAC:

```

Terminal
COMMAND: ./mult bf16 fp32

BF16 multiply.
FP32 outputs.
Progress (of 64) 0-----1-----2-----3-----4-----5-----6---
Done.
Total number of inputs checked = 4294967296(      100000000)
Valid inputs don't produce NaN, Overflow (Inf), or Underflow (i.e. 0 when exact is not 0).

Number of Valid Inputs to Multiply = 3369741239(      c8da2bb7)
error range [ 50.00%,100.00%), valid inputs in range 0.08%(2750546), in or above range= 0.08%
error range [ 20.00%, 50.00%), valid inputs in range 0.16%(5461018), in or above range= 0.24%
error range [ 10.00%, 20.00%), valid inputs in range 0.19%(6406715), in or above range= 0.43%
error range [ 5.00%, 10.00%), valid inputs in range 0.22%(7247952), in or above range= 0.65%
error range [ 2.00%, 5.00%), valid inputs in range 0.37%(12350786), in or above range= 1.02%
error range [ 1.00%, 2.00%), valid inputs in range 3.63%(122356186), in or above range= 4.65%
error range [ 0.50%, 1.00%), valid inputs in range 50.75%(1710072241), in or above range=55.39%
error range [ 0.20%, 0.50%), valid inputs in range 37.29%(1256688117), in or above range=92.69%
error range [ 0.10%, 0.20%), valid inputs in range 5.46%(184012895), in or above range=98.15%
error range [ 0.05%, 0.10%), valid inputs in range 1.37%(46304288), in or above range=99.52%
error range [ 0.02%, 0.05%), valid inputs in range 0.39%(12261963), in or above range=99.92%
error range [ 0.01%, 0.02%), valid inputs in range 0.06%(1993827), in or above range=99.98%
error range [ 0.00%, 0.01%), valid inputs in range 0.02%(834705), in or above range=100.00%

Of all possible inputs (more than valid inputs)
NaN 0.78%(33488896 counts)
Inf 12.52%(537754624 counts)
Und 8.24%(353982537 counts)

Summary for spreadsheet. Inputs bf16. Output fp32.
4.65%
55.39%
92.69%
98.15%
99.52%
0.78%
12.52%
8.24%

Ignore: nan
COMMAND:

```

The bottom of the above screenshot displays the results of the test cited in Singular’s FAC as the results appear in an interactive computer terminal. As Google’s “expert” is undoubtedly aware,

the test is executed by typing a command at a command prompt. As the test executes, a transient output (the text within the **red** bracket) is displayed on the screen. When the interactive terminal window is closed the transient output is not permanently stored. But, by simply running the FAC Testing Code provided by Singular and as instructed by Singular, Google obtains the same results (in **blue**) as set forth in the FAC.³ Accordingly, Google's unfounded allegations regarding alleged non-produced output files for the numbers set forth in the FAC should be rejected.

III. CONCLUSION

For the reasons set forth above, the Court should deny Google's Renewed Motion to Compel.

Dated: May 10, 2021

Respectfully submitted,

/s/ Paul J. Hayes

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³ To the extent that Google challenges the numbers set forth in the FAC, discovery is still open.

CERTIFICATE OF SERVICE

I hereby certify that all counsel of record who have consented to electronic service are being served with a copy of this document via the Court's CM/ECF system.

/s/ Paul J. Hayes